CLAIMS

We claim:

1. A self-aligning holographic optical system, comprising:

a grating substrate supporting a holographically-formed diffraction grating and

an array mount for defining relative locations of point sources of light, the array mount comprising:

recording points defining locations of point sources of recording light used to illuminate the grating substrate during fabrication of the holographically-formed diffraction grating; and

use points defining locations of light apertures used in operation of the holographically-formed diffraction grating, the use points having a defined positional relationship with the recording points, the light apertures at the use points being capable of optical communication via the holographically-formed diffraction grating.

2. The system of claim 1, additionally comprising:

optical fibers located at the recording points.

3. The system of claim 1, additionally comprising:

pinholes located at the recording points.

4. The system of claim 1, wherein the apertures comprise the ends of optical fibers.

5. The system of claim 1, wherein the apertures comprise an entrance slit and at least one exit slit in the array mount.

6. The system of claim 1, wherein the use points comprise locations that are the same as the recording points.

7. The system of claim 1, additionally comprising:

a thin metallic layer coating the surface of the holographically-formed diffraction grating.

8. A method of making a self-aligning optical system, the method comprising:

determining a positional relationship between locations of use points and locations of recording points with respect to a holographic diffraction grating;

providing an array mount having recording points and use points at the locations that satisfy the positional relationship;

fabricating the holographic diffraction grating by illuminating a photosensitive layer with recording light emitted by point sources of light located at the recording points in the array mount such that light apertures at the use points in the array mount optically communicate via the holographic diffraction grating.

9. The method of claim 8, further comprising:

determining the locations of the recording points from design parameters of the holographic diffraction grating.

10. The method of claim 8, further comprising:

locating optical fibers at the recording points for emitting the recording light.

11. The method of claim 8, further comprising:

locating pinholes at the recording points for emitting the recording light.

12. The method of claim 8, further comprising:

locating ends of optical fibers at the use points to optically communicate via the holographic diffraction grating.

13. The method of claim 8, wherein at least one of the use points has a same location as at least one of the recording points.

14. A method of aligning an optical system with a holographically-formed diffraction grating, comprising:

determining a positional relationship between relative locations of use points and recording points with respect to the holographically-formed diffraction grating;

providing an array mount with the use points and the recording points at locations satisfying the positional relationship; and

aligning the recording points in the array mount with the holographically-formed diffraction so that the use points in the array mount are self-aligned with the the holographically-formed diffraction grating.

15. The method of claim 14, the method further comprising:

determining the locations of the recording points from design parameters of the holographic diffraction grating.

16. The method of claim 14, the aligning step comprising:

producing an interference fringe pattern by illuminating the holographically-formed diffraction grating with recording light at the recording points; and

positioning the recording points to produce an interference pattern with less than one interference fringe.